

NON-PUBLIC?: N
ACCESSION #: 8808300320
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Beaver Valley Power Station Unit 2 PAGE: 1 of 4

DOCKET NUMBER: 05000412

TITLE: Reactor Trip During Rod Control System Troubleshooting
EVENT DATE: 07/27/88 LER #: 88-009-00 REPORT DATE: 08/25/88

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: T. P. Noonan, Plant Manager TELEPHONE #: 412-643-1258

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: AA COMPONENT: XXXX MANUFACTURER: W351
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On 7/27/88, Operations personnel were performing a surveillance test to verify control rod movement. During the test, Shutdown Bank "A" (SBA) would not move. No Rod Control Urgent Alarm was received. The operators verified all disconnect switches were connected and again attempted to move SBA rods, with the same result. The other shutdown and control rod banks were verified operable. At 1415 hours, SBA was declared inoperable and the unit entered the ACTION statement of Technical Specification 3.1.3.1. Instrument and Control (I&C) personnel suspected a faulty Stationary Gripper Coil Firing Circuit Card and proceeded to the 1AC Power Cabinet. No visible problems were identified. I&C personnel removed the suspect card and upon removal, a group of rods controlled by the 1AC Power Cabinet fell into the reactor, initiating a Power Range Negative Rate Neutron Flux reactor trip at 1441 hours. The operators used the Emergency Operating Procedures to stabilize the plant. The problem was determined to be a failed buffer card and was sent to the vendor for analysis. There were minimal safety implications as a result of this event. This event is bounded by the Updated Final Safety Analysis Report, Section 15.

(End of Abstract)

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On 7/27/88, with the Unit in Power Operation (Operational Mode 1) at 100% reactor power, Operations personnel were performing Operating Surveillance Test (OST) 2.1.1. This OST, "Control Rod Assembly Partial Movement Test", is performed monthly to verify proper control rod and shutdown bank rod movement. During the performance of OST 2.1.1, when Shutdown Bank "A" (SBA) was selected to be moved in, the bank did not move. The reactor operator noted correct rod direction and rod speed indication on the control board, however, SBA would not move. No Urgent Alarm was received upon this failure of SBA rods to move with a demand signal present. The operators verified all rod disconnect switches were connected for all rods and again tried to move SBA rods in. The rods did not move. The reactor operator then tried to move the other control and shutdown banks and was successful. At 1415 hours, SBA rods were declared inoperable. The operating crew conservatively placed the Unit in the ACTION Statement of Technical Specification 3.1.3.1. The ACTION Statement required the Unit to be in Hot Standby (Operational Mode 3) within 6 hours.

Instrument and Control (I&C) personnel were called in to investigate and correct this problem. I&C personnel examined the 1AC Power Cabinet. There were no Urgent Alarms lights lit on the cabinet and no other visible problems noted during the inspection of the Power Cabinet. I&C personnel noted that the correct Group Select light would illuminate when a group of rods powered from this cabinet was selected by the reactor operator. I&C personnel suspected that the Stationary Gripper Coil Firing Circuit Card for SBA, Group 1, was faulty and made preparations to replace this card. The reactor operator was instructed to select SBA in the Control Room. I&C personnel were then going to remove the suspect card, giving the Control Room an Urgent Alarm (the alarm would be generated for "Any Loose Card"). This would also cause the Rod Control System to energize the Movable Gripper Coils for those rods, in order to hold the rods in their current position. I&C personnel then proceeded to remove the Stationary Gripper Coil Firing Circuit Card, with the immediate result of a Group of rods from this power cabinet falling into the reactor. This was due to the inherent timing in the circuits used for Urgent Alarm generation (energization of Movable Gripper Coils) and the Stationary Gripper Coils. The group of rods falling into the reactor initiated a Power Range Neutron Flux Negative Rate Reactor Trip (-5% in 2 seconds). The operators immediately entered Emergency Operating Procedure (EOP) E-0, "Reactor Trip or Safety Injection", transitioned to EOP ES-0.1, "Reactor Trip Response" and stabilized the plant in Hot Standby (Operational Mode 3).

In accordance with 10 CFR 50.72.b.2.ii, the Nuclear Regulatory Commission was notified of this event at 1552 hours on 7/27/88.

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Designation of Root Cause

During the Rod Control System troubleshooting, I&C personnel pulled the Stationary Gripper Coil Firing Circuit Card. The removal of this card initiated a logic race within the Logic Cabinet to determine if the Movable Gripper Coils (Urgent Alarm generation circuit) or the de-energization of the Stationary Gripper Coils (due to the card removal) would occur first. Westinghouse was consulted following the trip and stated that removal of this card should not have resulted in a rod drop event, however, I&C personnel duplicated the event in subsequent rod control testing. Based on this testing, it was determined that I&C personnel committed an inappropriate action and should not have pulled the Stationary Gripper Card Firing Circuit Card. I&C personnel, based on previous Rod Control System experience, suspected a Supervisory Buffer Card (P/N 3359C83G01) and a Master Cyclor Selector Card (P/N 3359C56G02). These cards were sent to Westinghouse for testing. Further investigation, conducted offsite by the vendor, yielded a faulty electronic chip (chip Z-1) in the Supervisory Buffer Card and no problems with the Master Cyclor Selector Card.

Immediate Corrective Actions

1. The operators utilized the Emergency Operating Procedures to stabilize the plant in Hot Standby (Operational Mode 3).
2. I&C personnel replaced the faulty Supervisory Buffer Card and a Master Cyclor Selector Card.

Long-term Corrective Actions

1. The Supervisory Buffer Card and a Master Cyclor Selector Card were sent out to the vendor (Westinghouse) for evaluation and identification of the mode of failure.
2. The Licensing and Compliance Group is pursuing a Technical Specification change which would allow plant personnel seventy-two (72) hours to repair the equipment before having to enter Hot Standby, rather than the current six (6) hours specified in Technical Specification 3.1.3.1.b.

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3. I&C personnel are developing Rod Control System Troubleshooting Guidelines for future evolutions of this type.

Safety Implications

There were no safety concerns to the public as a result of this event because the Reactor Protection System functioned as designed to initiate a reactor trip upon the drop of more than one control rod. This type of event has already been analyzed in the Updated Final Safety Analysis Report (UFSAR), Section 15.4.3.2, "Rod Cluster Control Assembly Misoperation".

Previous Occurrences

LER 87-012-00 discusses two events involving dropped rods which resulted in manual reactor trips. The rod drops were caused by faulty thyristers in the Movable Gripper circuit in the 2BD Power Cabinet.

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August 25, 1988
ND3SPM:0289

Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
LER 88-009-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

In accordance with Appendix A, Beaver Valley Technical Specifications, the following revised Licensee Event Report is submitted:

LER 88-009-00, 10 CFR 50.73.a.2.iv, "Reactor Trip During Rod Control System Troubleshooting".

Very truly yours,

/s/ for
T. P. Noonan
Plant Manager

cj
Attachment

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August 25, 1988
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